Space Weather Forecast

Issued on Sunday, 07 May 2023 at 01:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of R1-R2 Radio Blackouts throughout. Low confidence coronal mass ejection arrivals day 1 (07 May) bring a likelihood of G1-G2 Minor/Moderate storms, with a chance of G3/Strong Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low through the last 24 hours with the largest flare peaking at just below Moderate class at 05/2227UTC from an old region just beyond the southwest limb. There are a trio of spot groups spanning the northeast to north-centre disc that appear interconnected in magnetic imagery, however all three sunspot appear to have stabilised somewhat with no notable growth ongoing. The only growth is some small development around the leader of a small and simple sunspot in the southeast disc. There are three further, but magnetically simple spots.

Multiple CMEs were observed through the UTC day, either appearing directed off the Sun-Earth line from front-sided sources, or from limb events. All have now been modelled and results show no Earth directed components.

Solar Wind / Geomagnetic Activity: The solar wind was indicative of the arrival of a slow CME, but with some magnetic material, followed by a transition into faster winds from a coronal hole. Observed speeds initially at background, but showed a small but sudden rises with the CME arrival just after midnight. Speeds then erratically climbed to be elevated at 500-550 km/s by midday, and have continued at these levels for the remainder of the UTC day. The total magnetic field strength also increased from background at the same becoming strong with a strongly negative (southward) north-south component for a time. This rotated to be strongly positive (northward), before the strength of the magnetic field gradually eased to Moderate to Weak levels. The north-south component then became variable. Geomagnetic activity was initially Active (Kp4) to G2 Moderate storm (Kp6) between 06/0000-0600 UTC, but then gradually subsided to become Quiet to Unsettled (Kp 2-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: A chance of Moderate activity is expected through the next four days, mainly from the regions in the northeast to north-centre disc.

Solar Wind / Geomagnetic Activity: Two CMEs which left the Sun on 04 and 05 May respectively, are forecast to arrive on day 1 (07 May), perhaps concurrently, with a risk of effects into 08 May. Confidence is low with their speeds, along with how they interact and with uncertainties with how much material will be within them. Current elevated solar winds are due to the influence of CH99 HSS. These elevated winds are expected to gradually ease through the

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period, once any CME influence has passed.

Generally Quiet to Unsettled conditions are expected at first day 1 (07 May). Any CME arrivals are then expected to bring a spell of G1-G2 Minor to Moderate storms, with a chance of G3 Strong storms. This risk recedes later day 2 (08 May) with activity becoming mainly Quiet to Unsettled.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to persist at background levels with no solar radiation storms occurring.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	70	20	5
Strong	G3	No	25	20	1	1
Severe	G4	No	2	2	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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